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## ABORIGINAL QUARRIES AND SHOPS AT MILL CREEK, ILLINOIS<sup>1</sup>

By W. A. PHILLIPS

The quarries and shops about the village of Mill Creek, in southern Illinois, have been known for many years, but up to the present time have received only passing notice. The remains, however, indicate an important source of the large flaked implements of Mississippi valley, while the material quarried is one widely distributed in finished products. Identified with a region of unusual interest, the locality ranks with other centers of aboriginal flaking which have been recently studied.

Previous work relating to the subject is apparently covered in the following references. In Prof. Cyrus Thomas' description<sup>2</sup> of remains in Union and Alexander counties an account is given of the appearance of the main group of quarry pits west of the village and mention made of the prevalence of flaking refuse on many sites in the vicinity, notably on the Hale farm. In Professor Thomas' catalogue reference may also be found.<sup>3</sup> Another description of the mounds, by Mr G. W. Morse, was published in volume III of the *American Antiquarian*.

In 1886 Mr Gerard Fowke visited the locality and inspected the quarries, and subsequently described many of the products of the shops. In his classification of the types of spades this author cites numerous examples from Union county and refers to series of unfinished forms obtained at Mill Creek.<sup>4</sup> From Mr Fowke and

<sup>1</sup> Read before Section H, American Association for the Advancement of Science, Columbus meeting, August, 1899.

<sup>2</sup> *Report of Mound Explorations of the Bureau of Ethnology*; Twelfth Annual Report, pp. 148, 154.

<sup>3</sup> *Catalogue of Prehistoric Works East of the Rocky Mountains*, p. 68.

<sup>4</sup> *Stone Art*; Thirteenth Annual Report Bureau of Ethnology, pp. 79, 133-138; figs 59, 169, 170.

from residents of the village I have learned that observations were also made at this place by Col. P. W. Norris in 1884 and later by Messrs R. E. Earll and L. H. Thing.

A number of Mill Creek rejects collected some years ago by Mr R. L. Fahs and now in the museum of Northwestern University, led to the present study, which was begun in December, 1898, and continued in April, 1899, under the direction of the Field Columbian Museum. The writer is especially indebted to Dr G. A. Dorsey, curator of anthropology in the last named institution, for valuable suggestions and personal assistance in the exploration. As the work is not yet finished, only a preliminary report can be offered.

*Material and Distribution.*—I cannot perhaps do better than to point out in the beginning the distribution of products in this stone. In collections which represent the general area—southwestern Illinois and eastern Missouri—several varieties of chert or flint reappear constantly as materials used for flaking, and of these certain distinguishing shades of color have thus far formed the basis of descriptions. They are spoken of as cream-white, whitish or light gray, yellow, brown and grayish-brown flint and chert, nodular bluish-gray hornstone, etc. The large forms classed as agricultural implements commonly occur in the darker varieties of rather coarse structure, although materials of finer grain corresponding to the lighter colors were shaped into smaller examples of the same class.

The chert obtained from the Mill Creek quarries was the least handsome of the flinty stones used for flaking. While generally of grayish-brown, an examination of the refuse heaps shows a number of colors. Sometimes the material is yellow or again brown, red-brown, mottled pink and gray, or gray, but all are of the same dirty or dusty cast. A banded arrangement of colors is also noticeable. In structure much of the material is coarse, fairly smooth on fracture, and with little or no luster. It is also soft in comparison with other flints and not remarkably brittle,

yet in one particular it surpassed all other stones and that was in its adaptability for flaking into broad, thin blades. More exact characters upon which to establish the identity of the chert derived from the Mill Creek diggings with that distributed over the region in finished tools will probably develop from microscopic sections now being prepared. Along both banks of the Mississippi to a point considerably north of St Louis, and in the opposite direction through the southeastern counties of Missouri, blades of this stone are common. As the limestone formation in which the chert occurs is of great extent, other sources probably exist.

*Locality.*—The village of Mill Creek, Union county, is situated on the Mobile and Ohio railroad, half a mile north of the south line of the county. The stream of the same name which passes out of Union county at this point, becomes the dividing line between Alexander and Pulaski counties next adjoining. The locality, therefore, includes small portions of three counties. The surface is hilly and wooded. In the sketch map (figure 1) the sites of quarries and shops are indicated. The main group of pits is one mile west of the village on portions of Sec. 31, T. 13 S., R. 1 W., and Sec. 36, T. 13 S., R. 2 W. There is a smaller group two miles north of the village on Sec. 19, T. 13 S., R. 1 W., near the middle of the section. Shops are scattered about the hills both near to and at a distance from the quarries. The large shop site in Sec. 6, T. 14 S., R. 1 W. (Alexander county), offers the greatest visible accumulation of refuse. A railroad cut at Weaver hill, about three miles north of the village, and several mounds, are also shown on the map.

*Geology.*—Extensive phenomena of rock disintegration are met with in this part of the state which lies south of the glacial boundary, and it is with one of these that we have to deal in examining the source of the chert. The railroad cut at Weaver hill furnishes an excellent view of the chert-bearing formation, and a study of the soil and rock exposed at this point was of

great service in trenching the quarries. The section is through clay overlying the limestone. In the sides of the cut and in the embankment beyond the hill, nodular masses of chert are scattered in great numbers. Details and measurements taken at the

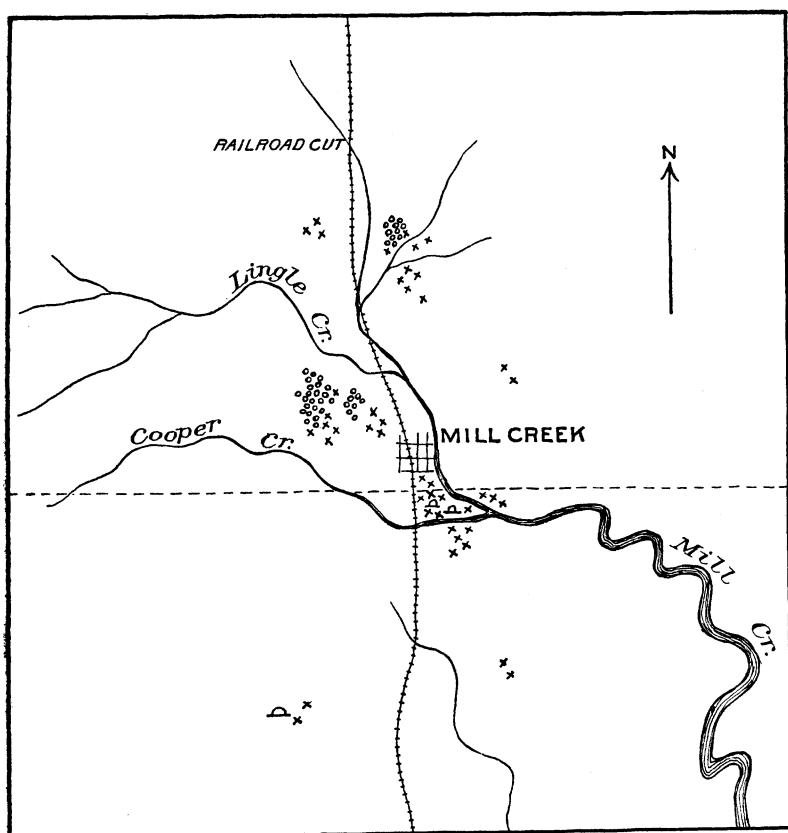


FIG. 1.—Map of the vicinity of Mill Creek, showing location of quarries and shops.

middle of the cut were as follows: Fifteen feet of reddish clay constitute the upper stratum, which is free from gravel and other stones with the rare exception of a pebble here and there near the bottom of the layer. A broken pavement-like layer of cherty rock, eight inches thick, lies next below, but is poorly defined. Twelve feet of clay of a deeper red, mixed with coarse sand and many free nodules of chert, complete the section down

to the limestone. There is no arrangement of the nodules as they lie in the clay. The limestone may be seen to a depth of nine feet and presents an uneven surface. Cavernous hollows and furrows six to eight feet deep, and of irregular width, separated by rounded and often fantastic prominences of rock, characterize the exposure throughout its length, a distance of several hundred yards. The original condition and manner of occurrence of the chert are at once apparent. Thin horizontal rows of concretions, often regularly spaced and mainly of one size in a given layer, stand out of the softer rock in a conspicuous manner. Many empty socket-like cavities show where nodules have dropped from their places, while loose nodules may be rattled about in other cavities which have not dissolved to such an extent as to free the stone. A much greater thickness of limestone than the twelve feet now represented in mixed clay, sand, and chert next above must have existed to supply the number of concretions that are found free.

The conditions here presented probably do not occur within the glacial boundary, except in the driftless area, which Mr Leverett informs me offers similar phenomena in northern Illinois.

There are few nodules to be seen on the surface or in natural exposures in the surrounding country, still they were observed in stream beds at two points on branches of Mill creek south of Weaver hill, and a large block of limestone with a row of protruding nodules occurs several miles west of the village on a branch of Lingle creek. A knowledge of the underlying stratum containing free chert concretions might formerly have been gained from such occurrences.

*Characters of the Chert Nodules.*—Externally the nodules are all of a rusty brown color, rough and harsh and slightly encrusted. In shape they are usually thin and flat with curved outlines and rounded edges, but as with many other nodular formations the shapes and sizes are exceedingly varied. The cross-section is

generally in the form of an elongated ellipse (figure 2, *b*), which greatly facilitated the flaking of large products. Some masses are like flagstones, occasionally two feet long and half as wide, and

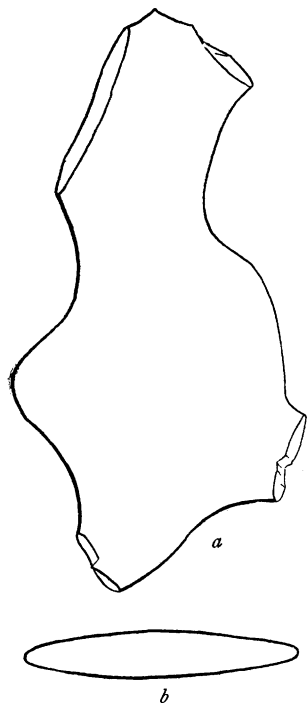


FIG. 2—Outline of large chert nodule and characteristic cross-section. (One-sixth natural size.)

vary from two to five inches in thickness. Small nodules are like flat-pebbles and cobblestones. Several smaller masses are often united by arms or extensions, with openings between, while the shapes of familiar objects, the heads of animals, etc., are imitated.

*The Quarry Sites.*—The main site of ancient quarrying is reached by a path along the top of the hill which rises directly west of Mill Creek station. The distance is little less than a mile to the first of the pits, a group covering four or five acres, while across a narrow valley and on the next hill to the west, the pits cover an area of ten or twelve acres. The land is wooded, but many of the larger trees have been felled and a considerable growth of small trees

and bushes obstructs a general view. Bowl-shaped depressions, twelve to forty feet in diameter, are closely crowded together over the top and down both sides of the hill. Few exceed four feet in depth, but accumulations of leaves hide the surface. While the exploration was in progress, a fire which burned over the area of the smaller group did much to reveal surface appearances. Although scattered refuse is fairly abundant, it is in great measure imbedded in the soil. Along the west slope, at the head of a steep side-valley in the hill, the pits are elongated into indistinct trenches.

In regard to the number of pits on this hill, a definite result was never obtained in spite of many attempts to count them during the early part of the investigation, but it is safe to say that there are several hundred. Any count, however, would be inexact if surface indications only are considered, as facts learned from the excavation will show.

The pits located on Sec. 19, north of the village, occupy a low hill in the corner of a field which has long been cultivated, and in extent cover about three acres. This is probably the place to which reference is made by Professor Thomas<sup>1</sup> as difficult to plow on account of stone refuse. A section of the hill seems formerly to have been exposed by the stream which flowed through an old lagoon on the southeast, and in disclosing the presence of the nodules may have led to the ancient quarrying. The remains of about forty pits were counted, although cultivation has nearly

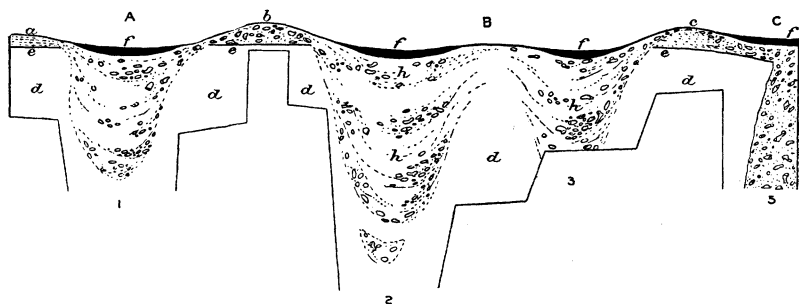


FIG. 3.—Diagram of trench in western wall of quarry site. A, B, C, average depressions in the surface of quarry site; a, b, c, dump piles; d, undisturbed red clay; e, former surface; f, mold; 1, 2, 3, ancient pits filled by natural agencies; 5, position of a pit filled at the time of active quarrying; h, h, h, quarry tools. Length of section, 62 feet; greatest depth, 24 feet. The angular outline represents the floor of the trench seen in profile.

leveled the surface. Near the fences just above the stream bank the pits are well defined.

*Excavation on the Main Quarry Site.*—A trench shown in figure 3 was dug along the top of the hill near the northern end of the large group of pits. Two well-marked depressions (A and B in the diagram), were selected for the purpose, one nineteen feet, the other thirty-two feet in diameter, separated by a bank about

<sup>1</sup> *Mound Explorations*, op. cit., p. 155.



three feet high (*b*). Digging was begun on each side of the bank, and the undisturbed clay and former surface of the hill determined at that point. Above the old soil the pile consisted of a mixture of broken nodules, coarse sand and clay, and occasional flakes and rejects.

Extending the section across both depressions, a deposit of black forest mold was first encountered, covering the surface of each pit to a depth of eight or ten inches at the thickest portion. Below the black mold, material like that found in the bank but showing partial sorting and arrangement in bowl-shape layers, was followed to a considerable depth. The old pit (marked 1) was traced to a depth of over ten feet, with a width of ten feet at the mouth between undisturbed soil. Pit 2 was followed to a depth of eighteen and one-half feet, with a width at the top of thirteen feet. As the work progressed it became evident that two old pits occupied the space of the single large depression (*B*). The second of these (3) was not traced below seven feet; its width at the mouth was approximately twelve feet. The mixed material which filled the openings was of yellowish color, and soft and wet in comparison with the stratum of firm red clay which surrounded it; there was therefore very little difficulty in tracing the outlines in the wall of the excavation. The openings were funnel shaped, and judging from the partial arrangement of the filling, had acquired their form from natural causes — the gradual washing in of the surrounding dump-piles and the caving of the edges.

In tracing the old pits, the dump-piles, *a* and *c*, seen at the right and left in the figure, were intersected by the trench. These piles differed from the one first excavated, in that *a* was wholly clay, and *c* clay topped with a layer of broken nodules. Save for the dump-piles and mixed contents of the pits, the section was altogether in the overlying red clay represented at the railroad cut by a thickness of fifteen feet and here by several additional feet. Stone had not been encountered at any point in undisturbed relations. An attempt was then made to reach the

nodule-bearing stratum, and the depth at the lowest level in the trench, under pit 2, was increased to twenty-four feet, when stone was encountered. The wet contents of the old pit, however, made further work dangerous, and a cave-in followed soon after the bottom was abandoned.

Trenching was then continued through the next depression (C), shown at the right, when the outlines of two more openings appeared, one in either wall of the trench. Pit 4 presented the characters of the three already described; pit 5 was quite different. While the mouths of the pits previously examined had evidently been left open when deserted by the quarrymen, the last pit exposed had been filled when still fresh with material brought from the bottom of some neighboring pit, and had therefore been preserved in its original shape. This pit was traced to a depth of ten and one-half feet and was found to slant into the trench in a manner favorable for excavating. Its contents were like the material found in bank *b*,—mainly broken nodules without arrangement or sorting. Operations were here brought to an end, but measures were taken to protect the work done on this portion of the trench that it might be resumed at the stage in which it was left. The trench reached a length of sixty-two feet.

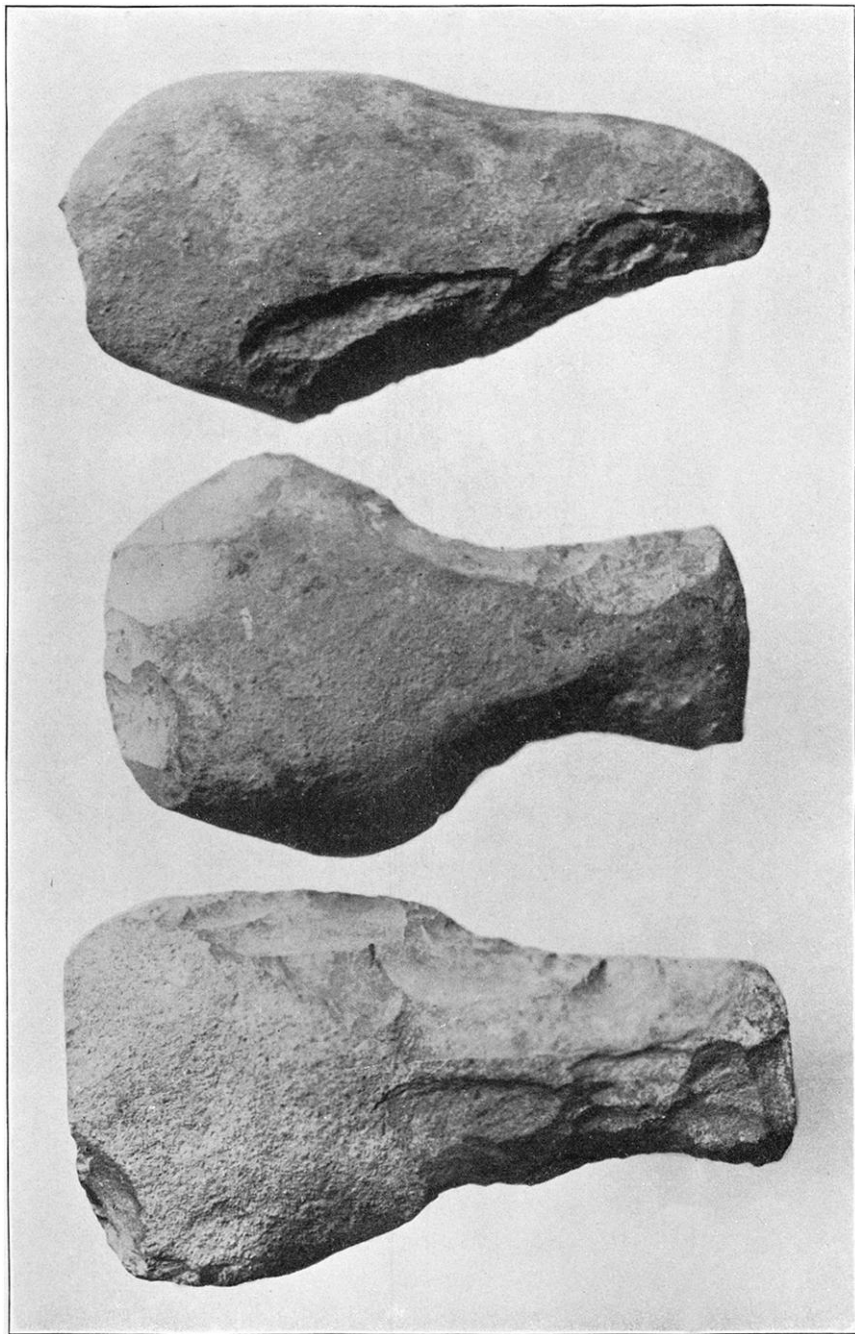
The distribution of art remains need only be pointed out in this connection. Hammers of peculiar type were found in pits 2 and 3 at the places indicated by *h*, *h*. Flakes were fairly well represented in some layers of the filling, and were encountered as far as the pits were traced. Few rejects of stages of working above that of testing were found in the excavation. A broken flaked stone, classed as a reject at the time of finding, has since with washing proved to be a used implement—a digging tool in all probability. Nodules bearing the marks of a few blows, as evidenced by the loss of a single flake or the presence of a fracture, constituted the main proof everywhere of previous handling and testing of the stone.

The character of the section shows that no change is now

going on, and present conditions have probably existed during the whole period of growth of the trees standing on the site. Few trees grow in the depressions; the largest oaks, some of a diameter of two feet, are rooted in the old dump-piles above the former surface.

*The Quarry Refuse.*—In digging through the clay, the ancient quarrymen brought to the surface so much of that material that its mixture with the stone refuse was constantly resulting, and this fact in some measure accounts for the scarcity of visible quarry-shop litter; still, in some spots, especially on the western slope of the hill, low piles were observed which were examined for the purpose of determining the character of the work done after the nodules were brought to the surface. Over circular spaces averaging fifteen feet across, broken nodules were scattered as if a selection of desirable stone had been made. The work was confined mainly to trimming off bunches and irregular ends and testing the quality of the stone by such fractures and occasional flaking. Some rejects occur of stages of working far advanced toward finished forms, but they are relatively few. Shaping seems commonly to have been carried on farther from the site of quarrying. Small shops occur on the cleared land at the southern end of the hill, and others near by may be obscured by the forest.

*Quarry Tools.*—The tools recovered from the trench were probably all used in the quarry work proper. The used and broken blade shown in figure 4, *a*, was a thick, roughly shaped implement of a type similar to the agricultural tools of the region. While not complete, its shape is readily supplied from other examples obtained from the lodge sites. Its original length may be considered to have been equal to specimen *b* of the same figure, or about thirteen inches. The wear at the broad end of the blade consists of a rounding off of the edge, but without the degree of polishing which is generally so marked in the used spades and hoes. It was doubtless hafted and used in digging.



QUARRY TOOLS FOUND IN THE TRENCH (ONE-HALF NATURAL SIZE)

The hammers (plate I) were provided with short handles, shaped out of the stone, and in every instance presented a pol-

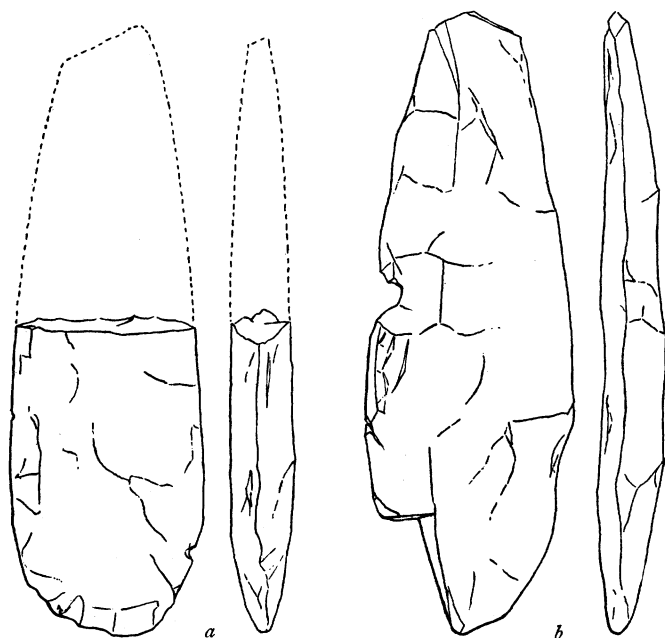


FIG. 4—Quarry tools. *a*, used half-blade found in the trench; *b*, from a lodge site. (One-fourth natural size.)

ished area on the flat side of the hammerhead (figure 5), presumably from friction and contact with the thumb while in use. It seems likely that this tool was used in a flatwise position in the hand (figure 6), and with an upward stroke, judging from the flaking at the heavy end, and that its function was to loosen the nodules from the clay. If this interpretation is correct, the specimens are in the main right-handed examples. The average length of this tool is eight inches.



FIG. 5—The use-marks on the quarry hammer.

*Accumulations of Shop Refuse.*—Shop refuse is abundant on the Hale farm,

at the county line, between the railroad and the creek. A group of mounds on this farm has been described as situated "in the midst of or rather on an immense refuse heap; in fact the whole top of this ridge appears to be covered to a depth of from three to six feet with an accumulation of flint chips, broken pottery, mussel shells, etc. Charcoal, burned limestone, and other evi-

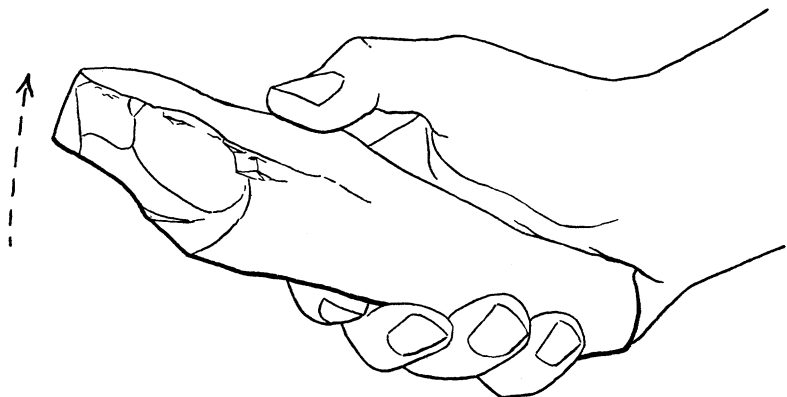


FIG. 6—Probable method of using the quarry hammer. In the position indicated an upward blow would cause the flaking of the heavy end as well as friction under the thumb.

dences of fire are plentifully scattered throughout the mass. The locality would probably be better described as a kitchen heap averaging four to five feet in depth and covering several acres."<sup>1</sup>

An area of three acres about the Hale house is thickly covered with refuse, while this tract might be increased to six or eight acres to include scattered patches. The farmhouse stands on the larger mound, while an orchard, barnyard, and garden occupy at least half of the ridge where the remains are most abundant. The depth of the deposit has been overestimated.

On the hill across the valley at the south, an area of two or three acres offers similar litter, likewise the extension of Pulaski county directly east on the opposite side of the creek.

On the Heilig, Goodman, and Fink farms, southeast of the smaller group of quarries, there are many accumulations of refuse, and here the manner of occurrence is better shown than in the

<sup>1</sup> Thomas, *Mound Explorations*, op. cit., p. 148, map.

confused deposits on the Hale place. Flaking refuse generally in this vicinity occurs in well-defined circular spaces about thirty feet in diameter and from several inches to a foot in thickness at the center. Unfinished, broken, and rejected work, with quantities of flakes, covers the ground with little mixture of soil save at the edges where the material is distributed more sparingly. Such deposits are seen everywhere in the fields, and in spite of repeated plowing are still distinctly outlined. Near the southwest corner of the Fink farm one of these accumulations was trenched. The excavation revealed little concerning the flaking refuse, which could not be made out from inspection of the surface, but besides the chert there was found to be a collection of charcoal at the middle of the space, and fragments of pottery, several broken and used hoes, hammerstones, a limestone tool, and grinding-stones completed the list of mixed objects. In view of this result all similar deposits were interpreted as lodge sites, and on the Hale farm the area so thickly covered with the same mixture of remains must have been repeatedly dwelt upon and used as a site of working until the various deposits joined and possibly lay one above another.

*Rejectage, Flakes, and Products.* — The main features of rejectage are here essentially the same as in all leaf-blade working, and the principles established by Professor Holmes need only be applied to the special case in hand.

The nodules were eminently suited for flaking, and natural shapes supplied width and relative thinness when required. Remarkable results seem chiefly to be due to a regard for the common cross-section shown in figure 2. A preliminary thick stage was therefore eliminated in a measure from a large portion of the work done, and massive forms do not appear as often as in the rejectage of quarry-shops generally. Thin rejects, on the other hand, are numerous and in any other known group of shops might pass for very successful shaping in the various stages represented.

Again, certain forms intended to be strong and thick have been shaped from thick nodules or in a manner designed to preserve relative thickness. This class of rejectage is very similar to the average forms of waste blades found in the Peoria quarry-shop in Indian Territory and described by Professor Holmes.<sup>1</sup>

The shape of the nodule often supplied a desirable curve on-the-flat which has been commented on in descriptions of the finished products. The rejectage also contains many specimens illustrating the shaping of forms which are prominently convex on one side and flat on the other.

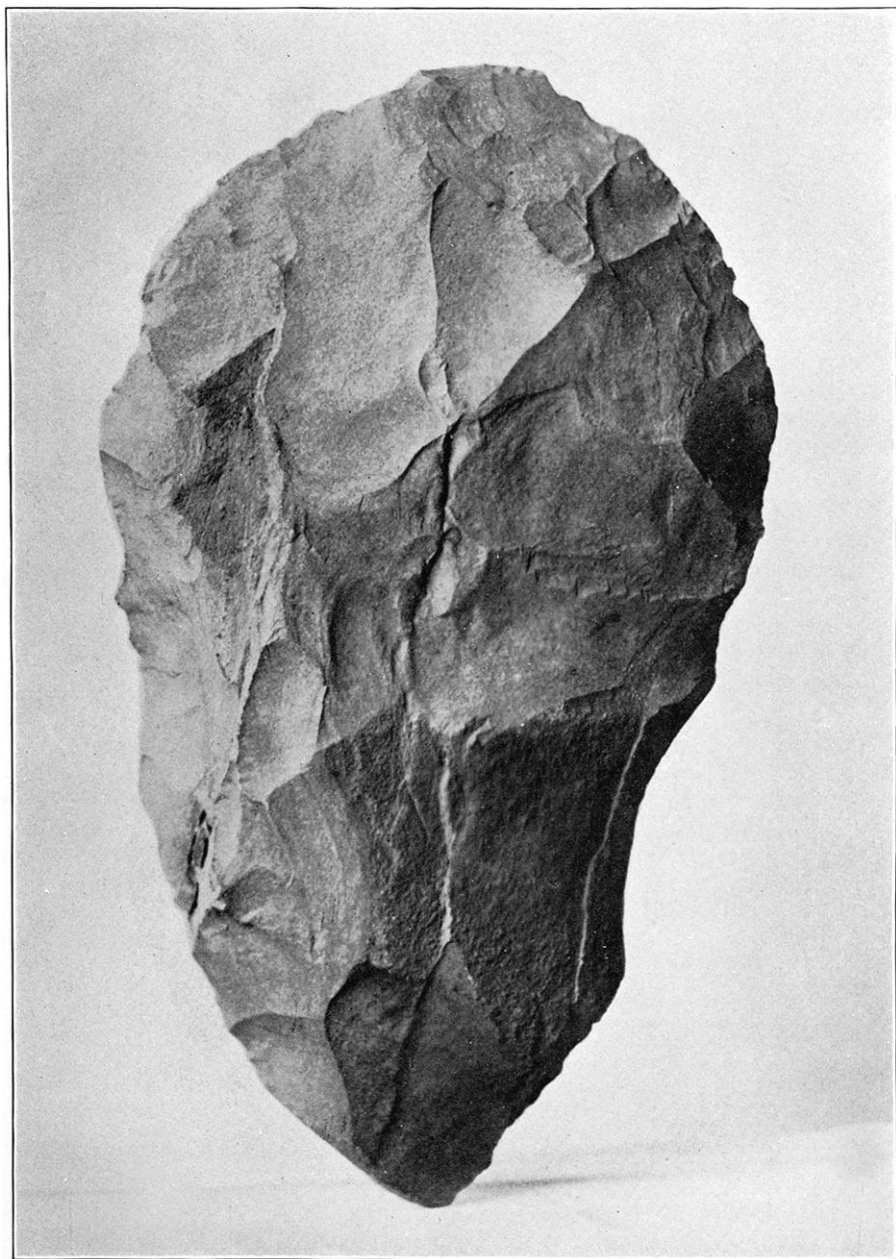
In size and shape rejected blades are exceedingly variable and a wide range of products is easily traced. The forms which pass into broad thin blades (plate II) vary from eight to seventeen inches in length, four to nine inches in width, and one-half to three inches in thickness. Half-blades are common. Long and relatively narrow forms pass into thin knife-like blades on the one hand and into thick celt-like forms on the other. Circular forms are not so frequent. Some highly developed products were finished by grinding on-the-flat, while an edgewise grinding is characteristic of all rejects which have arrived approximately near completion. As a rule the latter operation affected only that part of the implement which was designed to enter into the hafting.

A more striking example of flakage probably does not exist in any similar line of refuse. The flakes are uniformly large, thin, and wide, and commonly are four inches in length where products like the spades have been shaped. Exceptional flakes are of much greater length. Favorable natural shapes with the superior flaking quality of the material were evidently the circumstances which made the spades and hoes possible, whatever may

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<sup>1</sup> Bureau of Ethnology, Bulletin U = 21. A visit was made to Peoria for the purpose of comparing the refuse found there with that observed at Mill Creek. Both places have yielded products of large size, and while there are many points of difference and the finished forms of the Peoria material are not yet perfectly known, the two localities doubtless have supplied very similar implements.





AVERAGE REJECT OF SPADE FLAKING FROM THE HALE SHOP SITE (ONE-HALF NATURAL SIZE)

have been the special skill of the worker or his method of operating.

Mill Creek products are among the most noteworthy of the great family of leaf-blades, and deserve a detailed account which is quite beyond the scope of the present paper. They are well represented in museums and are familiar to archeologists. Fifteen or twenty specializations were observed in collections in the vicinity. Implements made here were used in a different class of pursuits from those flaked at Piney branch and Flint ridge. The rejectage which would occur in shaping smaller forms, as projectile heads, is altogether absent.

*Tools of the Flaking Shops.*—Tools recovered from the shop sites include numbers of flaking hammers of the ordinary type found throughout the country. They are principally of the same material as the stone worked. A few hammers with handles like those found in the trench also occur, but the heavy end is battered about the edge as in the case of the flaking hammer. Stones used for grinding are particularly abundant. Some specimens are of large size and are marked with deep grooves from the edgewise grinding of implements, while others are without grooves and were used for grinding on the flat. Many rejects served as grinding tools (figure 7), the sharp incrustation of the nodules being particularly effective in abrading. Blocks of sandstone were also used.

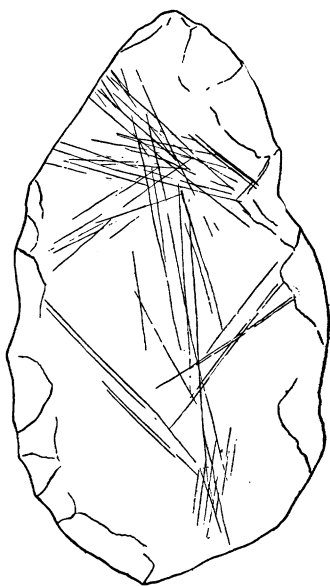


FIG. 7.—Reject used as a grinding-stone. Appearance of the common form with marks from edgewise grinding. (One-fourth natural size.)

*Associated Remains.*—Important remains are associated with the industry which has been described. The stone grave mound

on the Hale farm and the large mound on which the house stands were built at the time of active quarrying and flaking. Refuse is distributed among the cists and mixed with the earth of which the mounds are made ; refuse has also accumulated on lodge sites located over the excavation where material for the mounds was dug. Much other evidence is of a character to connect the industry with the ancient race whose works extend through the middle Mississippi valley.